

position to Belle Isle the sea was thickly studded with large and small bergs. In the Straits of Belle Isle counted forty-seven bergs, mostly packed in the east portion of the straits, and gradually becoming fewer towards Point Amour.

8th.—N. 52° 50', W. 50° 29', large bergs and small broken ice; N. 53° 17', W. 51° 30' to Cape Norman, numerous large and small bergs right in the track of steamers bound through Straits of Belle Isle.

9th.—N. 51° 30', W. 56° 20', large and small bergs.

14th.—N. 53° 27', W. 50° 14' to Cape Norman, large icebergs.

16th.—N. 52° 11', W. 49° 48' to Belle Isle, large bergs.

17th.—Off Point Amour, three large bergs.

18th.—Off Belle Isle, five large bergs; N. 49° 52', W. 54° 07', one large and one small berg; Point Amour to N. 52° 11', W. 53° 52', numerous very large bergs.

19–20th.—Straits of Belle Isle to N. 52° 30', W. 51° 50', a number of bergs, some large.

20th.—N. 43° 34', W. 48° 38', a few small pieces of ice.

22d.—N. 53° 10', W. 50° 04', a large berg, and from that position to Cape Norman, several bergs of various sizes; off Cape Norman, numerous bergs.

23d.—N. 52° 34', W. 52° 30', numerous bergs.

24th.—N. 52° 25', W. 52° 25' to Belle Isle, a number of bergs; in the Fairway, five hundred and seven miles east of Belle Isle, two large bergs aground, saw them in same position last voyage; N. 55° 15', W. 53° 30', four large bergs; N. 58°, W. 40°, a large field of ice; N. 53°, W. 45° to N. 48°, W. 50°, 24th to September 1st, numerous bergs.

25th.—N. 52° 06', W. 48°, large berg about one hundred and fifty feet high; N. 52° 50', W. 51° 26', several small bergs; N. 53° 15', W. 52°, one large berg.

26th.—Straits of Belle Isle clear of ice from Belle Isle to N. 53° 16', W. 51°, where there were numerous bergs large and small; N. 51° 23', W. 50° 40', three large bergs.

### TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for August, 1889, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

In August, 1889, the mean temperature was highest in the lower valley of the Colorado River, where, at stations in southern Nevada and adjoining parts of Arizona and California, the values rose above 95°, the highest mean reading, 102°.5, being reported at Volcano Springs, Cal. In San Bernardino, the southeastern part of Inyo, and the eastern half of San Diego counties, Cal., southern Nevada, and a considerable portion of southern and western Arizona, the mean temperature was above 90°. The mean readings were above 85° in the Rio Grande Valley, and were above 80° over western Florida, at stations south of a line traced irregularly westward from southern Georgia to Arizona, and in areas in northern Utah, central Kansas, and the valleys of the Sacramento and San Joaquin rivers, Cal. The lowest mean temperature of the month was reported at stations in Lake Co., Colo., along the California coast north of San Francisco, and in the lower Saint Lawrence valley, where it fell to or below 55°. The mean temperature was below 60° along the immediate Pacific coast from San Francisco, Cal., to the British Possessions, central and north-central Colorado, north of a line traced irregularly eastward from the northern coast of Lake Superior to the lower Saint Lawrence valley, and at coast stations in eastern Maine and western Nova Scotia.

The mean temperature was generally below the normal in the Saint Lawrence Valley and the Canadian Maritime Provinces, and from the Atlantic coast states westward south of the Lake region to the middle, eastern, and southeastern slopes of the Rocky Mountains, in the valley of the Columbia River, and at Los Angeles, Cal. Over the upper lakes and thence westward to the valley of the Columbia River, in the Rocky Mountain and plateau regions, and along the middle and southern Pacific coast the month was generally warmer than the average August. The most marked departures below the normal occurred in the Saint Lawrence Valley, southwestern Maine, from central Virginia to the south Atlantic coast, over the southern extremity of Florida, in central Arkansas and northwestern Louisiana, north-central Kentucky, and central

Tennessee, where they equalled or exceeded 3°. The greatest departures above the normal were noted in the British Possessions north of Montana, and in Arizona, where they were more than 5°. Considered by districts, the greatest average departure below the normal temperature occurred in the Florida Peninsula, where it was 2°.7; in the Ohio Valley and Tennessee the average departure below the normal temperature was 2°.5; in the south Atlantic and west Gulf states, 2°.2; in the east Gulf states, 2°.1; in the middle Atlantic states and the southeastern slope of the Rocky Mountains, 1°.8; on the north Pacific coast, 1°.2; in the lower lake region and the upper Mississippi valley, 1°.1; in New England, 1°.0, and in the northern plateau region, 0°.7. The greatest average departure above the normal, 3°.6, occurred in the southern plateau region; in the middle plateau region the average departure above the normal was 2°.1; in the extreme northwest, 2°.0; in the middle eastern slope of the Rocky Mountains, 1°.4; in the northeastern slope of the Rocky Mountains, 1°.2; on the middle Pacific coast, 1°.1; in the upper lake region, 0°.9; in the Missouri Valley, 0°.5, and on the south Pacific coast, 0°.2. In the Rio Grande Valley the mean temperature averaged normal.

The following are some of the most marked departures from the normal at the older established Signal Service stations:

Above normal.		Below normal.	
Whipple Barracks (Prescott), Ariz....	7.4	Father Point, Quebec.....	4.0
Medicine Hat and Qu'Appelle, N.W.T.	6.0	Key West, Fla.....	3.8
Santa Fe, N. Mex.....	3.9	Lynchburg, Va.....	3.6
Denver, Colo.....	2.8	Portland, Me.....	3.4
Salt Lake City, Utah.....	2.4	Little Rock, Ark.....	3.2

### DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for August, 1889; (4) the departure of the current month from the normal; (5) and the extreme monthly means for August during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of Aug.	(2) Length of record.	(3) Mean for Aug., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for Aug.			
						Highest.	Year.	Lowest.	Year.
Arkansas.		°	Years	°	°	°		°	
Lead Hill.....	Boone.....	77.9	7	77.1	-0.8	81.0	1886	75.5	1882

## Deviations from normal temperatures—Continued.

State and station.	County.	(1) Normal for the month of Aug.	(2) Length of record.	(3) Mean for Aug., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for Aug.			
						Highest.	Year.	Lowest.	Year.
<i>California.</i>		°	Years	°	°	°		°	
Sacramento .....	Sacramento	71.6	36	67.1	-4.5	76.0	1866	66.2	1887
<i>Colorado.</i>									
Fort Lyon .....	Bent	76.6	20	77.1	+0.5	81.2	1881	72.4	1870
<i>Connecticut.</i>									
Middletown .....	Middlesex	74.7	17	66.4	-8.3	73.0	1870	65.9	1861
<i>Florida.</i>									
Merritt's Island .....	Brevard	80.7	5	78.8	-1.9	81.5	1888	78.8	1889
<i>Georgia.</i>									
Forsyth .....	Monroe	78.9	15	77.4	-1.5	82.4	1878	73.2	1885
<i>Illinois.</i>									
Peoria .....	Peoria	75.6	33	73.4	-2.2	80.5	1881	70.1	1866
Riley .....	McHenry	68.8	33	68.1	-0.7	73.4	1867	64.1	1885
<i>Indiana.</i>									
Vevy .....	Switzerland	75.1	23	72.4	-2.7	80.7	1881	69.9	1875
<i>Iowa.</i>									
Cresco .....	Howard	69.2	16	69.1	-0.1	72.6	1881	63.1	1885
Monticello .....	Jones	70.1	35	69.7	-0.4	77.1	1861	64.3	1863
Logan .....	Harrison	73.7	15	72.4	-1.3	79.6	1881	68.2	1875
<i>Kansas.</i>									
Lawrence .....	Douglas	75.5	21	72.7	-2.8	83.4	1874	71.1	1884
Wellington .....	Sumner	76.6	10	76.5	-0.1	82.6	1881	70.1	1884
<i>Louisiana.</i>									
Grand Coteau .....	Saint Landry	82.1	6	78.9	-3.2	83.6	1883	78.9	1889
<i>Maine.</i>									
Gardiner .....	Kennebec	66.4	49	*	.....	71.5	1840	62.5	1866
<i>Maryland.</i>									
Cumberland .....	Allegany	69.8	30	69.2	-0.6	75.7	1871, '72	63.6	1866
<i>Massachusetts.</i>									
Amherst .....	Hampshire	67.3	53	65.1	-2.2	71.6	1872	63.5	1866
Newburyport .....	Essex	67.0	11	65.3	-1.7	69.5	1882	65.3	1889
Somerset .....	Bristol	71.7	17	70.5	-1.2	75.0	1877	68.6	1874
<i>Michigan.</i>									
Kalamazoo .....	Kalamazoo	69.5	12	68.7	-0.8	73.0	1881	63.8	1885
Thornville .....	Lapeer	69.6	12	69.9	+0.3	74.5	1881	64.7	1885
<i>Minnesota.</i>									
Minneapolis .....	Hennepin	68.0	24	69.9	+1.9	72.3	1881	63.8	1885
<i>Montana.</i>									
Fort Shaw .....	Lewis & Clarke	64.8	19	65.5	+0.7	69.8	1882	53.7	1873
<i>New Hampshire.</i>									
Hanover .....	Grafton	65.8	43	63.8	-2.0	70.4	1881	59.2	1885
<i>New Jersey.</i>									
Moorestown .....	Burlington	72.1	26	69.9	-2.2	76.1	1864	68.1	1883
South Orange .....	Essex	70.9	18	68.1	-2.8	74.5	1877	68.1	1883, '89
<i>New York.</i>									
Cooperstown .....	Otsego	65.7	35	62.4	-3.3	71.5	1877	61.0	1861
Palermo .....	Oswego	67.0	29	63.6	-3.4	71.6	1877	61.6	1885
<i>North Carolina.</i>									
Lenoir .....	Caldwell	73.6	16	70.4	-3.2	77.0	1877	70.4	1874, '89
<i>Ohio.</i>									
N'th Lewisburgh .....	Champaign	70.7	57	70.8	+0.1	75.0	1880	64.0	1876
Wauseon .....	Fulton	69.5	19	68.0	-1.5	72.8	1872	63.0	1870
<i>Oregon.</i>									
Albany .....	Linn	65.7	10	63.2	-2.5	68.7	1888	62.5	1881
Eola .....	Polk	64.9	19	63.9	-1.0	68.6	1870	61.2	1881
<i>Pennsylvania.</i>									
Dyberry .....	Wayne	64.6	21	61.2	-3.4	68.3	1872	58.4	1866
Grampian Hills .....	Clearfield	67.7	25	65.8	-1.9	73.1	1881	62.1	1866
Wellsborough .....	Tioga	66.4	10	62.3	-4.1	71.3	1881	62.3	1889
<i>South Carolina.</i>									
Statesburgh .....	Sumter	77.4	8	73.5	-3.9	79.7	1881	73.5	1889
<i>Tennessee.</i>									
Austin .....	Wilson	78.9	18	75.8	-3.1	84.6	1881	75.8	1889
Milan .....	Gibson	76.2	6	74.5	-1.7	78.1	1887	73.4	1883
<i>Texas.</i>									
New Utm .....	Austin	82.5	17	81.1	-1.4	84.4	1873	79.4	1879, '82
<i>Vermont.</i>									
Stratford .....	Orange	67.7	16	65.9	-1.8	72.6	1884	63.9	1885
<i>Virginia.</i>									
Bird's Nest .....	Northampton	76.7	21	74.4	-2.3	80.1	1877, '78	65.3	1871
<i>Wisconsin.</i>									
Madison .....	Dane	69.1	17	70.0	+0.9	72.2	1878	64.2	1885
<i>Washington.</i>									
Fort Townsend .....	Jefferson	61.5	16	59.2	-2.3	64.3	1874	58.9	1876

\* Report not received.

The above table shows that at Middletown, Conn., with a broken record of seventeen years, the mean temperature for the current month was 1° 7 above the highest mean reported for the corresponding month of previous years, noted in 1870. Unusually low mean temperatures are not shown by this table.

## MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperature reported at regular stations of the Signal Service was noted within an area extending from the lower Colorado and Gila valleys northwestward to the upper San Joaquin valley, where the values rose to or above 110°, the highest reading, 115°, being registered at Fort McDowell, Ariz. In the plateau regions from the middle valley of the Snake River southward, in the Sacramento and San Joaquin Valleys, from the Missouri Valley in Dakota westward to south-central Montana, and from the Rio Grande River north-

ward over the western half of Texas to central Indian Territory the maximum temperature rose to or above 100°. The lowest maximum temperatures were reported on the coast of northern California, where they fell to or below 70°. Along the immediate Pacific coast north of San Francisco, and at stations on the southeast and east New England coast the maximum temperature was below 80°. One station, Fort Assiniboine, Mont., with a record of ten years, reported the highest absolute temperature noted at that place for August, the reading for the current month, 99°, being one degree above that of August, 1882, while at Fort Sully, Dak., thirteen years record, the maximum temperature corresponded with the highest maximum noted for two or more preceding years. Reports of the older established Signal Service stations show that the highest temperature recorded for August was generally noted in the Ohio Valley and Tennessee, northern Louisiana, Arkansas, lower Michigan, northern Ohio, Virginia, Maryland, eastern Pennsylvania, and New Jersey in 1881; in eastern New York and western Connecticut in 1888; in eastern Georgia in 1878; in Alabama and along the southwest coast of Lake Michigan in 1874; in the Rio Grande Valley in 1877; in Indian Territory, northern Texas, and south-central Kansas in 1888; in adjoining parts of Iowa, Illinois, and Wisconsin in 1887; in northern Minnesota in 1886; and in Washington Territory in 1885; elsewhere the periods of occurrence were irregular. The following are maximum readings in the several states and territories where maximum temperature of 100°, or over, was reported for August, 1889, as shown by reports of United States army post surgeons and state weather service and voluntary observers: Fort McDowell, Ariz., 117°; Volcano Springs, Cal., 126°; Fort Lyon, Colo., 106°; Steele, Dak., 110°; Andersonville, Ga., 108°; Boisé Barracks, Idaho, 100°; Fort Sill, Ind. T., 104°; Blakeville, Iowa, 104°; Minneapolis, Kans., 110°; Murray, Ky., 100°; Cameron, La., 101°; Montevideo, Minn., 100°; Lamont, Mo., 102°; Powder River, Mont., 110°; Fort Sidney, Nebr., 106°; El Dorado Canyon, Nev., 117°; Deming, N. Mex., 109°; Georgetown, Ohio, 100°; Fort Hancock, Tex., 110°; Saint George, Utah, 111°; Haywood and Wauzeka, Wis., 102°; Fort Laramie, Wyo., 102°. Among extremely high temperatures reported for August in preceding years by United States army post surgeons are, 121° at Fort Boisé, Idaho, in 1871, and 119° at Fort Mojave, Ariz., in 1875. Among high temperatures for August at Signal Service stations, other than those given in the table of miscellaneous meteorological data, are 115° at Fort Lapwai, Idaho, in 1882; 110° at Umatilla, Oregon, in 1882; 98° at Delaware Breakwater, Del., in 1885, and 97° at Burlington, Vt., in 1876.

The only regular stations of the Signal Service reporting minimum temperature of 32°, or below, excepting Mount Washington, N. H., where 28° were registered, were Saint Vincent, Minn., Fort Klamath and Linkville, Oregon, where 32°, 24°, and 32°, respectively, were noted. The reports of United States Army post surgeons and state weather service and voluntary observers show that the temperature fell to 25° at Breckenridge, Colo., 31° at Grayling, Mich., 32° at Fort Logan, Mont., and 29° at Fort Bridger, Wyo. The temperature fell below 40° in the valley of the Red River of the North, over a greater portion of Wyoming and southwestern Montana, and within an area extending from central and eastern Oregon southward over northwest Nevada. The minimum values were below 50° in south-central New Mexico, the upper Ohio valley, and north of a line traced irregularly south of west from the Maine coast to east-central California. Along the immediate Pacific coast the minimum temperature fell to or below 50° from San Francisco, Cal., northward. At the following-named stations the minimum temperature was as low or lower than previously recorded for August during the periods of observation: Portland, Me., eighteen years record, 0° 5 below minimum of 1885 and 1887; Jacksonville, Fla., eighteen years record, 1° below minimum of 1886; Key West, Fla., nineteen years record, 1° below minimum of 1888; at Cedar Keys, Fla.,

ten years record, Galveston, Tex., nineteen years record, Chattanooga, Tenn., eleven years record, Escanaba, Mich., sixteen years record, and Neah Bay, Wash., five years record, the same as minimum of two or more preceding years. At Fort Klamath, Oregon, five years record, the minimum was the same as that of 1887. In eastern Pennsylvania, southeastern New York, and western Connecticut the lowest temperature reported for August by Signal Service stations was generally noted in 1885; in Maryland and the District of Columbia in 1874; in the upper Ohio valley, south-central Virginia, northern Georgia, southeastern Minnesota, and southwestern Wisconsin in 1887; on the South Carolina and Georgia coasts in 1879; on the middle Gulf coast and in the Rio Grande Valley in 1884; in west-central Minnesota and northwestern Dakota in 1886; and in adjoining parts of Nebraska, Wyoming, and Colorado in 1876. In all other sections the periods of occurrence were irregular.

#### RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at regular stations of the Signal Service are given in the table of miscellaneous meteorological data. The greatest monthly ranges occurred in the lower valley of the Red River of the North, whence they decreased eastward to less than 30° at Erie, Pa., and along the New England and middle Atlantic coasts; southeastward and southward to less than 20° on the North Carolina and east and middle Gulf coasts; and southwestward and westward to less than 30° along the immediate Pacific coast. At Fort Klamath, Oregon, the monthly range exceeded 60°.

The following are some of the extreme monthly ranges:

Greatest.		Least.	
Saint Vincent, Minn.....	63.0	Hatteras, N. C.....	17.0
Fort Klamath, Oregon.....	63.0	Port Eads, La.....	18.0
Fort Sully, Dak.....	59.0	Key West, Fla.....	19.0
Fort Du Chesne, Utah.....	59.0	Nantucket, Mass.....	21.0
Wilcox, Ariz.....	53.0	Eureka, Cal.....	22.0

#### FROST.

The following are the only reports of frost injurious to vegetation during August, 1889:

Galena, Ill.: the low grounds in this section were visited by frost on the morning of the 1st, which did considerable

damage to vegetables. Tobacco was also severely injured.—*Union and Advertiser, Rochester, N. Y., August 2.*

Grand Rapids, Wis.: this section was visited by severe frost during the night of the 4-5th, which destroyed a great portion of the cranberry crop.—*Milwaukee, Wis., Journal, 6th.*

Linkville, Oregon: heavy frost occurred on the morning of the 19th, causing considerable damage to vegetables.—*Report of Signal Service observer.*

In the preceding month the only report of frost injurious to vegetation was received from the voluntary observer at Coulter, Colo. Reports of preceding years show that heavy frost in the United States is unusual during July and August, and that the first killing frosts generally occur in northeastern Dakota, central and northern Minnesota, and the more northern parts of Wisconsin and Michigan, where their average date of occurrence is about September 1st.

For August, 1889, light frost was reported in New England, New York, northern Pennsylvania, northeastern Ohio, northern Indiana, Michigan, Wisconsin, northeastern Iowa, in the valley of the Red River of the North, north-central Colorado, southwestern Dakota, central Montana, northern and southeastern Idaho, Utah, and Nevada. No frost was reported south of the fortieth parallel in districts lying east of the Rocky Mountains, nor on the Pacific coast, save at Linkville, Oregon.

#### TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for August, 1889:

Stations.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
Boston, Mass.....	66.5	57.0	9.5	62.6	67.4
Canby, Fort, Wash.....	65.5	55.0	10.5	61.4	57.6
Cedar Keys, Fla.....	88.7	80.9	7.8	85.6	80.4
Charleston, S. C.....	84.7	79.0	5.7	81.6	78.0
Eastport, Me.....	53.0	49.8	3.2	51.5	60.3
Galveston, Tex.....	88.0	81.0	7.0	85.1	81.5
Key West, Fla.....	86.2	79.3	6.9	84.5	82.1
Nantucket, Mass.....	74.5	70.5	4.0	72.7	67.4
New York City.....	72.4	69.0	3.4	70.0	71.5
Portland, Oregon.....	77.9	68.0	9.9	71.4	64.8

#### PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for August, 1889, as determined from the reports of nearly 2,000 stations, is exhibited on chart iii. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

In August, 1889, the precipitation was very irregularly distributed and was greatest in areas in extreme southeastern Massachusetts, south-central North Carolina, north-central and south-central Florida, north-central Georgia, and extreme southeastern Nebraska, where it exceeded ten inches, the greatest amounts reported in the several localities referred to being: 11.05, at Nantucket, Mass.; 11.89, at Florence, N. C.; 14.02, at Live Oak, Fla.; 15.56, at Diamond, Ga., and 12.10 at Tecumseh, Nebr. At stations in southeastern New England, southeastern New York, central New Jersey, southeastern Pennsylvania, eastern Virginia, south-central and eastern North Carolina, east-central, southern, north-central, and western Florida, east-central Alabama, southern Mississippi, south-

eastern Louisiana, along the Texas coast, in northeastern Arkansas, south-central and eastern Tennessee, northeastern Minnesota, southwestern Wisconsin, southwestern Iowa, northeastern Kansas, southeastern Nebraska, north-central and south-central Indian Ter., on the extreme north Pacific coast, and at Curtis, Ariz., the rainfall exceeded five inches. Along the California coast between San Francisco and Los Angeles, and thence northward in the valley of the Sacramento River to northern California, and northeastward to north-central Nevada no precipitation was reported for the month. At stations from the northwest coast of Lake Ontario to the southwest coast of Lake Michigan, in the central Ohio and upper Mississippi valleys, southwestern Arkansas, central and western Texas, the northeastern slope of the Rocky Mountains, the plateau regions, save in areas in the middle and southern plateau, and along the Pacific coast south of the forty-second parallel the precipitation was less than one-half inch.

The precipitation for August, 1889, was generally above the normal from southeastern New York to and along the Saint Lawrence Valley to the Gulf, on the south-central New England coast, in southern Florida, the interior of the south Atlantic and east Gulf states, along the west Gulf coast, in eastern and southwestern Tennessee, eastern Kansas, western Missouri, northern Indian Ter., the southern California